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ABSTRACT

The kinds of life events that may affect cognitive development were explored for 777 students, mostly freshmen, enrolled in introductory social science courses at Western Washington University Bellingham (Washington). Cognitive functioning was assessed using the Measure of Epistemological Reflection (MER) of M. B. Taylor (1983). Students also completed a Life Events Questionnaire concerning events in their recent past. Seventy-five of the freshmen were retested after 1 year. Several factor analyses explored the structure of the MER. Significant life events were found to be associated with a higher level of cognitive functioning. The most pervasive was the personal experience of intense inner insight. Other themes that were seen with some consistency were: (1) experienced divorce, separation, or the end of a serious love relationship; (2) experienced major change in church activity; (3) experienced sexual difficulties; and (4) independently made an important life decision. Scores on the MER showed only modest positive correlations, suggesting that the total score should be viewed with caution as an index of cognitive development. This finding was supported by the factor analyses, which indicated more than one factor, suggesting that cognitive development might be better described with two scores. Five data tables and two figures illustrate the study. (SLD)

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Impact of Life Experiences on Cognitive Development

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The impact of higher education on the cognitive development of college students has been the subject of numerous studies in recent years. In general, results of these studies have shown that cognitive development is positively related to level of education. Students with more education, at either the high school or college level, have been found to show more complexity in their thought processes than do students with less education. Neither sex nor major has been found to be a significant factor (Reynolds-Welfel and Davidson, 1986; but see Pohl and Pervin, 1968). However, Schmidt (1985) suggested that life experiences may also, either directly or in combination with education, promote cognitive development. Her results led Schmidt to conclude that neither age nor education taken separately seemed to have an impact, but that these two variables in combination seem to be associated with higher levels of thinking.

Schmidt's study compared traditional freshmen (18 years old) with non-traditional freshmen (21 years old). This narrow age range may have been insufficient to allow the independent impact of age to be revealed.

A study by Parker & Thorndike (1989) addressed some of the shortcomings in previous research. This study was conducted

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within the framework of Perry's (1970) theory of cognitive/ethical development. Perry investigated the changes that occur in students' thinking during the college years and proposed a scheme that divides the typical course of development into three broad stages; dualism, relativism, and commitment. A student's level of thinking, according to Perry, progresses from simple to complex. A simple thought process is evidenced by a dualistic reasoning style wherein knowledge and truth are seen as absolute; authorities and values are either right or wrong. This simple cognitive structure undergoes transformation with age and experience, becoming more complex. The complexity becomes apparent when students formulate views of reality that permit uncertainties, exceptions, and inconsistencies. With experience, people come to believe that truth is relative and contextual.

The Perry scheme has served as the theoretical framework for a number of studies of cognitive development in college students (eg. Baxter-Magolda & Porterfield, 1985; Kurfiss, 1977; Reynolds-Welfel & Davison, 1986; Taylor, 1983; Parker & Thorndike, 1989). There have been several attempts to develop measures of level of cognitive functioning on the Perry model. One that has been used fairly widely is the Measure of Epistomological Reflection (MER) (Taylor, 1983).

In one part of their study, Parker & Thorndike (1989) used the MER to compare traditional-age (17-22) freshmen, sophomores, juniors, and seniors with non-traditional-age (23-61) students in the same classes. Parker & Thorndike's results showed a significant main effect for education level, a significant main

effect for age, and no interaction. Subsequent analyses revealed that when age differences between education levels were eliminated, the effect of education disappeared. Conversely, significant age effects remained for all education levels except seniors. There was a tendency for mean MER score to increase with age up to about 35 years of age.

A second phase of the Parker & Thorndike (1989) study compared college students with same-age peers who had never gone to college. There were no differences in MER scores between those subjects who had had about 1.5 years of college education and those subjects who had no college experience. These results led Parker & Thorndike to conclude that the positive effect of education in previous studies may well have been due to an age effect rather than an education effect.

The present study expands on existing research by exploring in more detail the kinds of life events that may affect cognitive development. The MER was administered to 777 students enrolled in introductory social science courses at Western Washington University. At the same time, students completed a Life Events Questionnaire which asked them about the occurrence of various events in their recent past (e.g. marriage, death of a close relative), how intensely the event affected them, and how much control they felt they had in the situation.

A second phase of this study examines some of the psychometric properties of the MER. For an instrument to be a useful measure of some trait it must possess characteristics that are consistent with its use. Since the MER is intended to

measure a property that should show reasonable stability, but some growth with time, subjects should maintain their relative position in the group but show some growth. Other studies (e.g. Taylor, 1983) have found adequate interjudge reliability in scoring the MER, but its temporal stability has not often been addressed. Retest data with a one year interval were collected for a subsample of 75 of the students.

In addition to concerns with its reliability, most uses of the MER have involved reporting a single score that is the sum or average of the ratings for the six separate themes. Such a use implies that the themes should be fairly highly correlated with each other and the instrument should show a single factor when submitted to factor analysis. Several analyses were carried out to explore the dimensional structure of the MER.

Method

Sample

The first sample was composed of 777 undergraduate students. Sixty-three percent were female, and the mean age was 19.7 years. The majority, 570, were freshmen. The second sample was composed of 75 of the freshmen who were retested during their sophomore year, at which time their mean age was 20.9 years.

Instruments

The MER is a paper-and-pencil essay-response instrument which asks questions in each of six domains: a) decision making, b) the role of the learner, c) the role of the instructor, d) the role of peers, e) evaluation, and f) view of

knowledge, truth and reality. Each domain addresses a theme in Perry's scheme. The first question in each domain is intended to focus the respondent's thinking on the area being explored, and follow-up questions are designed to draw out the respondent's reasoning. Most students take about one hour to complete the MER (Taylor, 1983).

Figure 1 about here

The Life Events Questionnaire (LEQ) listed 26 events. If subjects had not experienced the event during the preceding two years, they left it blank. If they had experienced the event, they rated the amount of control they felt they had had over the event on a five-point scale from "none" to "complete." They also rated the impact of the event on a five-point scale from "very negative" to "very positive."

Figure 2 about here

Procedure

Subjects in sample 1 filled out both instruments during regularly scheduled meetings of social and behavioral science classes. Subjects in sample 2 filled out the MER during a special session at the University Testing Center, but did not complete the LEQ. All MER responses were sent to Dr. Taylor (Baxter-Magolda), the author of the instrument, and were scored by her and a colleague.

Results

Important Life Events

Subjects were classified by whether they reported having experienced a given life event, and mean MER scores were compared for those reporting the event and those not reporting having the event for each of the six MER themes. With 26 events and 6 themes, there were 152 comparisons, and 33 of them were significant at the 0.05 level. This would not be a finding of particular note, except that in every case the higher scoring group was the group reporting having experienced the event. Were there not some relationship, about half of the differences should have been in favor of the students who had not experienced the event. The significant events for each MER theme are listed in Table 1. Several events showed a pattern of being related to more than one MER theme, but only Event 26, "A personal experience of intense inner insight," was related to all six themes.

Table 1 about here

The overall score on the MER (the sum of the scores on the individual themes) was also computed and subjected to the above comparison. Only one event, number 26, was significantly related to total MER score, and this is obviously a consequence of this event being related to all MER themes.

The total number of life events experienced by each subject was computed to determine whether this variable might be related to MER scores. The mean number of events was 4.7, with a standard deviation of 4.6. There were 251 subjects who reported

experiencing none of the events, while 5 subjects reported over 20 events. These latter individuals probably either did not take the task seriously or did not understand it. There was no difference in MER score between those who reported no events and those who reported one or more, and the correlations of number of events checked with MER scores were zero.

Correlations Among the Themes

Four sets of correlations among the themes can be computed from the data of this study; the correlations based on the 777 cases in sample 1, the time 1 and time 2 correlations for sample 2, and the time 1 with time 2 correlations for sample 2. These correlations are presented in Tables 2 - 4. It is worth noting that all of the correlations are positive (with one minor exception in Table 4), and they are generally of modest size. Perhaps of greatest concern is the fact that the test-retest correlations on the diagonal in Table 4 are so low. The largest is 0.46, and in every case except theme 2, each time 1 theme correlates more highly with some other theme at time 2 than it does with itself on retest.

Tables 2, 3 and 4 about here

Changes over Time

It would be expected that there would be some growth from the first to the second year if cognitive level were being affected by the college experience. To test this hypothesis, the differences between scores at year 2 and scores at year 1 were

calculated for the subjects in sample 2. While some subjects showed an increase of up to two levels in MER score, others produced a drop of similar magnitude. The result was that three of the themes showed small average gains and three showed small average losses. None of the differences was statistically significant.

Factor Analyses

A number of factor analyses were preformed to explore the structure of the MER and to find the most sensible result. Principal components analysis was used to maximize the chance that substantive factors would be revealed. Since the Kaiser criterion (eigenvalues greater than 1) is known to extract too few factors for small sets of variables, the eigenvalues were examined and two factors were retained for rotation in the three analyses that involved six MER themes. The fact that all variables were positively correlated suggested an oblique rotation, so direct oblimin with a delta of 0 was used as a starting position. In each case, this proved to yield as good a solution as any delta value.

The three rotated pattern matrices for the total sample 1, for sample 2 at time 1, and for sample 2 at time 2, are presented in Table 5. There are definitely some differences, but it is interesting to observe that the pattern from sample 1 and the pattern from sample 2 at time 2 are quite similar. In both cases, the first factor is composed of themes 2-5, and the second factor is composed of themes 1 and 6. The difference is that in sample 1, theme 2 is split between the factors, while in sample 2

it appears entirely on factor 2. The sample 2 time 1 data present a different picture, with factor 1 having substantial loadings for all variables except theme 5 and factor 2 being composed of theme 5 and parts of themes 1 and 2.

Discussion

This study produced several interesting results. First, it does appear that there are significant life events that are associated with a higher level of students' cognitive functioning as described by the Perry scheme. The most pervasive of these is the personal experience of intense inner insight, which produced a gain on all MER themes. Other events that showed up with some consistency were:

#16 Experienced "Divorce, separation, or the end of a serious love relationship" (4 themes)

#15 Experienced "Major change in church activity (more, less or different church)" (3 themes)

#19 "Experienced sexual difficulties" (3 themes)

#22 "Independently made an important life decision" (3 themes).

Moving, experiencing a major change in financial condition, living away from parents, and experiencing a major health change each were associated with higher scores on two MER themes. While one would certainly not want to conclude that such events cause cognitive growth, the fact that students who reported these experiences showed higher mean scores than those not reporting them is consistent with the notion, suggested by Parker and

Thorndike (1989) that the stresses of living may be more important for growth than is the sheltered experience of the college campus. It should be noted that the effects remain, even when age is covaried out, and that MER scores do not seem to be affected by the perceived amount of control or the perceived impact of the events.

The fact that scores on the MER themes show only modest positive correlations suggests that total or overall score on the MER should be viewed with caution as an index of cognitive development. This caveat is supported by the results of the factor analyses, where more than one factor was found. The pattern that appeared in sample 1, and was supported by the results from sample 2 at time 2, seems to makes sense. Themes 2 - 5, which are quite explicitly related to classroom activities and beliefs, load on the first factor, while themes 1 and 6, which are more general in their referents, compose factor 2. If this pattern can be replicated with other samples, it suggests using two scores rather than one to describe students' levels of cognitive development.

The stability coefficients and the changes in scores over time suggest that the MER should be viewed as appropriate for research purposes only at the present time. Test-retest correlations ranged from a low of 0.17 to a high of 0.46. Three of the correlations exceeded 0.40, but this is modest stability at best and an inadequate basis on which to found any educational decisions. In addition, the fact that the theme scores correlated at least as highly with other themes as with

themselves casts doubt on whether the individual themes, as measured by the MER, represent constructs of sufficient generality or stability to advance the cause of understanding the cognitive processes of college students.

The analysis of change scores agrees with the longitudinal correlational data. Subjects showed inconsistent patterns of change from the first to the second testing. While the Perry model does not postulate a linear upward progression through the cognitive stages for a given individual, one would expect that group averages should show some growth, particularly during periods of significant lifestyle change such as the first year of college. The failure of the MER scores to show such a change casts doubt on either the instrument as a measure of Perry's theory or on Perry's model itself.

Before we discard either the MER or the Perry scheme, there is one additional explanation that must be considered. College students often participate in studies either because they are required to or because they have been enticed or are curious. But in either case there may be reason to suspect their motivations. Changes in motivation from one testing to another can have a very marked effect on students' behavior, and student attitudes toward participating in studies can undergo large changes in the course of a year at college. In the present study, some precautions were taken to encourage students to take the task seriously, but there is no guarantee that they all did so, even though students had to make an effort to participate in the second testing. Therefore, the present negative results

relating to the MER must also be viewed with caution because the failure to find high stabilities and positive changes in MER scores may be a result of motivational variables rather than weaknesses in the instrument or the theory on which it was based. Developing methods to assure that the subjects have a stake in the studies in which they serve is probably the most crucial methodological consideration in research on college student populations. Without adequate attention to this crucial element, all results must be viewed with suspicion.

Table 1

Life Events Associated with Significant Differences in MER Scores

MER Theme	Life Events
1 - Decision Making	7, 9, 15, 16, 19, 20, 22 - 26
2 - Role of Learner	7, 13, 16, 22, 26
3 - Role of Instructor	15, 22, 26
4 - Role of Peers	4, 5, 9, 15, 16, 19, 26
5 - Evaluation	16, 19, 26
6 - View of Knowledge	10, 25, 26

Table 2

Correlations among MER Themes for Sample 1

MER Theme	MER1	MER2	MER3	MER4	MER5	MER6
MER1	1.00					
MER2	.38	1.00				
MER3	.34	.38	1.00			
MER4	.31	.34	.30	1.00		
MER5	.28	.35	.35	.33	1.00	
MER6	.33	.35	.27	.28	.26	1.00

Table 3

Correlations among MER Themes for Sample 2

at Time 1 (below diagonal) and

Time 2 (above diagonal)

Time 1 MER Themes	Time 2 MER Themes					
	MER1	MER2	MER3	MER4	MER5	MER6
MER1	1.00	.33	.26	.28	.32	.34
MER2	.53	1.00	.41	.35	.44	.14
MER3	.63	.54	1.00	.31	.47	.25
MER4	.56	.38	.62	1.00	.65	.23
MER5	.46	.39	.39	.30	1.00	.34
MER6	.40	.35	.47	.40	.29	1.00

Table 4

Correlations among MER Themes for Sample 2

Time 1 with Time 2

(Test - Retest Reliabilities in the Diagonal)

Time 1 MER Themes	Time 2 MER Themes					
	MER1	MER2	MER3	MER4	MER5	MER6
MER1	.31	.15	.07	.04	.17	.34
MER2	.40	.46	.26	.16	.31	.22
MER3	.48	.39	.42	.37	.23	.40
MER4	.39	.19	.26	.17	.25	.22
MER5	.59	.45	.43	.35	.27	.49
MER6	.26	.26	.35	.22	-.01	.40

Table 5

Factor Patterns for MER Themes

MER Themes	Sample 1		Sample 2			
			Time 1		Time 2	
	Fact 1	Fact 2	Fact 1	Fact 2	Fact 1	Fact 2
MER 1	.18	.63	.57	.40	.16	.67
MER 2	.44	.41	.38	.51	.78	-.10
MER 3	.71	.05	.77	.17	.67	.06
MER 4	.57	.17	.85	-.06	.77	.00
MER 5	.86	-.16	-.08	.95	.79	.12
MER 6	.28	.85	.77	-.11	-.09	.92
Correlations between Factors	.44		.44		.39	

Figure 1

Themes of the Measure of Epistomological Reflection

Decision Making - "Think about the last time you had to make a major and difficult decision in which you had a number of alternatives. What was the nature of the decision?

Role of Learner - Do you learn best in classes which focus on factual information or classes which focus on ideas and concepts? Why do you learn best in the type of class you chose?

Role of Instructor - During the course of your studies, you have probably had instructors with different teaching methods. As you think back to the instructors you have had, describe the method of instruction which had the most beneficial effect on students.

Role of Peers - Do you prefer classes in which students do a lot of talking, or where students don't talk very much? Why do you prefer the degree of student participation that you chose?

Evaluation - Some people think that hard work and effort will result in high grades in school. Others think that hard work and effort are not the basis for high grades. Which of these statements is most like your own opinion?

View of Knowledge - Sometimes different instructors give different explanations for historical events or scientific phenomena. When two instructors explain the same thing differently, can one be more correct than the other?

Figure 2

Significant Life Events

1. Got Married
2. Gained a new family member (birth, sibling returning, etc.)
3. Violated the law (not including minor traffic violations)
4. Changed to a new school (not including this move to WWU)
5. Parents separated, divorced, or remarried
6. Held a regular job (full or part-time)
7. Moved at least 100 miles (not including move to WWU)
8. Traveled away from home for a period of at least two weeks
9. Major change in financial condition (better or worse)
10. Traveled outside the U.S. or Canada
11. Involved in a serious love relationship
12. honored for an outstanding personal achievement
13. Lived on your own, away from parents (not including WWU)
14. A close family member died
15. Major change in church activity (more, less or diff. church)
16. Divorce, separation, or end of a serious love relation
17. Major change in eating habits (a lot more or a lot less)
18. Received grades much higher or lower than expected
19. Experienced sexual difficulties
20. Major change in sleeping habits (more, less, or diff. time)
21. Major change in drinking or drug use
22. Independently made an important life decision
23. Was the victim of a crime
24. Failed to achieve some personnaly important goal
25. Major change in health for you or someone close to you
26. A personal experience of intense inner insight

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